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Hybrid Spinterfaces for Organic Antiferromagnetic Spintronics

A. Brambilla[1], A. Picone[1], M. Capra[1], A. Giampietri[1], A. Ferretti[1], F. Ciccacci[1], S. Fiori[2], G. Vinai[2], G. Panaccione[2], E. Molteni[3], S. Achilli[3], G. Fratesi[3]

[1] Dipartimento di Fisica, Politecnico di Milano, Milano, Italy
[2] Istituto Officina dei Materiali (IOM)-CNR, Laboratorio TASC, Trieste, Italy
[3] Dipartimento di Fisica "Aldo Pontremoli", Università degli Studi di Milano, Milano, Italy
alberto.brambilla@polimi.it

Spinterfaces, i.e. interfaces between an organic semiconductor (OS) and a ferromagnetic (FM) substrate, have been raising an ever-increasing interest in the last two decades, first through the realization of organic spintronics prototypical devices, then by showing new intriguing phenomena related to the formation of hybridized interface states [1]. As a promising development of the spinterface approach within the rapidly developing fields of *Antiferromagnetic (AF) Spintronics* and *AF Magnonics* [2], we have been extending those concepts to OS/AF interfaces, within an ongoing EU-FET project [3], during which we have been investigating different combinations of AF oxides, in particular Cr_2O_3, NiO and CoO, interfaced to various organic molecules, in particular belonging to the families of Metal-Tetra Phenyl Porphyrins (MTPP; e.g., CoTPP) and Metal Phthalocyanines (MPc; e.g., FePc) [4]. Both kinds of molecules are ideal candidates for building spinterfaces since their ion core can have its own magnetic moment, due to the presence of unpaired spins [5].
Here, we are going to present the concept of our project, where the spinterface represents a true 2D magnetic nanosystem, along with a series of results related to the growth and characterization (including crystalline, morphologic, electronic and magnetic properties) of selected spinterfaces. An example of the surface morphology of a molecular 2D layer of CoTPP on FeO/Fe is reported in the Figure. In many cases, those properties can be compared to computational results based on first-principle theoretical approaches (see, e.g., Ref. 6), which will also be briefly introduced.

References

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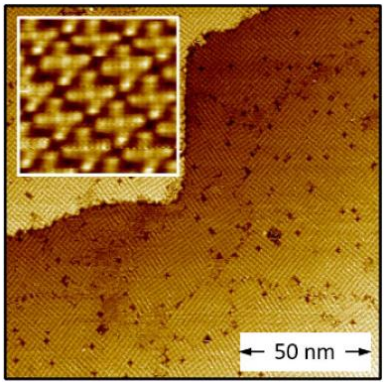

Figure 1. STM image of 1 ML CoTPP on Fe(001)-*p*(1x1)O. Inset: high-resolution scan 5.3x5.3 nm^2.